

ANALYSIS OF WEB-BASED LIBRARY SERVICES

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This study examined the services offered by libraries via their web sites. Web-based library services at fifteen academic libraries in North Carolina were evaluated using a combination of content analysis and questionnaires. The results of this study demonstrate a broad range of web-based services offered by academic libraries, from simple, text-based services, such as ready reference links, to more advanced services, such as online request forms. A few libraries offer innovative web-based services, such as digital collections. This study identified specific ways in which the web helps libraries improve and develop services. Some key improvements and developments are a) hyperlinks between resources; b) cross-departmental services; c) simple user interfaces to multiple services; and d) remote access to library services. This study also examined institutional characteristics and resources dedicated to web-based services.

Headings:

World Wide Web – College and university libraries.

College and university libraries – North Carolina.

Web sites - Evaluation.

Analysis of Web-Based Library Services

Overview

Reports about the increasing popularity of the Internet emerge almost daily. The Internet Software Consortium regularly conducts the Internet Domain Survey to count the number of hosts on the Internet and reported that there were 56,218,000 hosts in July 1999, an increase of almost 53% from just one year before (1998). Other surveys of the Internet attempt to capture different measures such as the number of Internet users or the number of web pages on the Internet. However, all of these numbers are simply estimates of something that is difficult to define and is constantly changing.

By definition, the Internet is simply a global network of networked computers. The World Wide Web, which enables navigation of the Internet through a graphical interface, is only one component of the Internet but is generally the most familiar to Internet users. The web integrates text, graphics, video, and sound files into a relatively simple user interface. As the most familiar interface to the Internet, the web represents both an information source (it contains data) as well as a communication channel (information and services are delivered through it). This dual functionality contributes to the social and physical changes occurring in today's home and work environments. Because of the increasing sophistication and popularity of the Internet and the web, we are changing the way we work and play and how our traditional

institutions look and act. Just a few examples of these changes are: electronic commerce, virtual communities, distance education, and intranets.

The library is only one of many institutions changing in the face of technological advances. With its wealth of data and information-sharing capabilities, the web is a natural complement to traditional library services. As of October 1999, there were over 3000 library web sites listed on Libweb, a well-known collection of links to library web pages (Dowling, 1999). Most libraries now offer at least minimal information about their services on a web site. Many libraries also offer access to some of their resources and services through their web site. Web-based library services can include online bibliographic instruction modules, access to circulation functions, online reference services, etc.

The inherent character of the web offers many advantages and improvements for library services including the ability to hyperlink to other resources, use of a graphical interface, and access for remote users. The web also offers libraries the potential for more revolutionary change as well. The library web site can become the main point of access for all library services, it can integrate services across departments, and can become a catalyst for new services. Our idea of what the library is and what it means to use the library will change as a result.

To gain a better understanding of the current state of library use of the web, this study examines the services offered by libraries via their web sites. The focus on services is intended to highlight the web's dual functionality as both an information resource and a communication channel. Goals of the study include: a) to describe the range of library services offered via the web; b) to demonstrate how libraries are using the unique features of the web to offer new

and/or better services; c) to compare a group of library web sites and evaluate the relationship with institutional characteristics; and d) to assess the institutional resources and processes in place to support web-based services.

The results of this study will provide descriptive data to librarians interested in creating or improving library web sites and services. Readers will have a clear picture of the current state of web-based library services against which they can benchmark their own web services. They will also learn how the unique features of the web can be used for new and better library services. The results document the current state of library web services and, ideally, the results can also serve as idea-generators for libraries looking to expand their web-based services.

Literature Review

The existing literature related to web-based library services falls into three main areas: assessment of the effectiveness of library web sites (including design issues and system tracking), examination of the role of the library web site within the larger institution, and discussion and evaluation of specific web-based services.

Effectiveness of library web sites

Much of the literature in this area focuses on basic web page design features, such as organization, visual and textual elements, and navigational aspects. Studies focus on general web design issues. John D'Angelo's (1998) examination of design guidelines for successful web pages is one example. He found these common topics in the guidelines: inclusion of basic page

information (e.g., dates), consideration of navigational characteristics, practical use considerations, and visual characteristics. He also found that selected “award winning” web sites followed some, but not all, of the guidelines and that no one guideline was followed by all of the web sites.

Other research specifically targets library web sites, such as David King’s (1998) review of the main pages of the 120 libraries in the Association of Research Libraries (ARL). He identified the common design elements and developed a description of the “typical” ARL library home page. Mark Stover and Steven Zink (1996) also examined college and university library home page design to assess design and organizational quality. They rated the designs based on a twelve-point scale, and came to the conclusion that many library web pages are poorly designed.

There is also an abundance of literature dealing with the “how-to” of designing web pages. These how-to articles are often found on the web itself, as well as in print. They cover the nuts and bolts of designing web pages, but contain little information about content or functional issues. One recent exception to this is a study by Laura Cohen and Julie Still (1999) that examined both the form and content of library web sites. They compared the library web sites from different types of higher education institutions for content, functionality, and structure. They found that most libraries share a common core of content on their web sites, including descriptions of services, news, and links to online resources. However, they concluded that research library web sites had a greater scope and scale compared to the web sites of small college library web sites.

Also included in this category is literature dealing with the technical aspects of assessing web site performance through server logs and other automatically generated data. For example, Christy Hightower, Julie Sih and Adam Tilghman (1998) developed a method of benchmarking library web sites using web site usage statistics. They used server access log files to evaluate how many individuals use resources on a particular web site, and how those numbers measured up to other library web sites.

The literature in this category reveals a continuing need to assess library web sites. Libraries need more information about the web, how to design good web sites, what to include on their web sites, and the behavior of web site users. In particular, the area of library web site content is not well studied and needs attention. The present study addresses the question of content by evaluating services offered via library web sites.

Role of the library web site

The literature in this area examines the overall purpose and goal of the library web site within the larger institution. Recent works demonstrate a marked change in attitudes compared with works from just a few years ago. For example, a 1996 handbook on library web sites focused on the creation of informative, text-based library web sites (Garlock & Piontek, 1996). In the revised 1999 version of the book, the authors state "Most initial versions of library web sites include typical information such as hours, policies and links to Internet resources. However, these minimal pages do not provide access to many library resources and services...Many libraries are now ready to move to the next stage of web development:

providing resources and services to their patrons via the library's online presence" (Garlock & Piontek, 1999. pp. 9).

The change in attitudes is also evidenced in The Library Web, a 1997 collection of essays about the development of various library web sites. The essays describe a process of evolution in thinking about the role of the library web site, from considering it as an information source to incorporating it as a critical component of the entire library. A comment from one of the essays clearly describes this change, "We first approached the internet as the equivalent of another online service that could supplement the commercial databases that we subscribed to, such as Dialog and Nexis ... [and later realized that] we would actually be able to weave the internet into traditional library services and collections." (Still, 1997. pp. 140).

Demonstrating the broadening role of the library web site, Karen Diaz (1998) listed these six roles: 1) library workstation (for both users and librarians); 2) delivery mechanism for library resources; 3) a way of making internal resources of products available; 4) agent for archiving and retaining online information; 5) a window to and a component of the web at large; 6) communication tool for a library and its users. These six areas cover virtually all aspects of library activities. Consequently, Diaz argued that in order to have a coherent web presence, every unit in the library must be involved in the web site. One implication of such a comprehensive approach is that the library web page may become a representation of the library itself (i.e., the "gateway" to the library).

In a rare example of a research study on the role of library web sites, a small portion of the Cohen and Still (1999) research examined the purpose of library web sites as manifested by

their content. When they compared the web sites of 100 libraries, including both Ph.D.-granting institutions and two-year colleges, they concluded that larger research library web sites better fulfilled the main purpose of an academic library web site, to serve as a tool for information, reference, and research.

The lack of research literature in this category points to a need for systematic study of the role of library web sites. The present study incorporates this concept and examines how libraries use their web sites as an extension of the library itself to deliver services to their users.

Web-based library services

The literature in this area deals with specific examples of web-based library services, such as instruction or reference service. Much of the literature consists of descriptive articles detailing how one library implemented the service, a discussion of the advantages and disadvantages of the service and perhaps suggestions about what worked and did not work for that library. One example of this is an article describing the process of implementing the Cornell University Library Gateway in which the authors examine the project "as a case study of project design, teams, and rapid-cycle time" (Calhoun, Koltay & Weissman, 1999).

Few research studies of types of web-based library services exist, but one exception is a study by Nancy H. Dewald (1999), which examined library instruction modules. She reviewed 20 web-based library tutorials and identified interactivity as the hallmark of good web-based instruction because it distinguishes between a program that simply presents information and one that is a learning experience. She described the kinds of interactive experiences possible in

web-based library instruction: "Students can respond to questions online with radio buttons, image maps, and forms, and they can receive immediate feedback ... Frames allow the introduction of a second activity without leaving the instruction module, such as opening an online catalog in a separate frame for a practice session or a test of the student's newly learned skills" (Dewald 1999. pp. 30). Interactivity is a key feature of other successful web-based services as well, such as circulation modules that allow patrons to manage their library account. These innovative services are made possible because of the web.

The literature dealing with specific web-based services is limited, with few actual research studies. This makes sense given the relatively recent creation of the web. The present study takes a broad view of web-based services, focusing on specific categories of services as well as the whole spectrum of library services.

Methodology

To better understand the current state of library use of the web, web-based library services were examined at a small group of academic libraries. The group included the libraries of the University of North Carolina at Chapel Hill (UNC) system. The UNC system is a multi-campus university composed of sixteen public institutions of higher education located in North Carolina. One UNC institution, the North Carolina School of the Arts, was excluded from this study because it is a combination high school and college. This decision was made to ensure consistent data comparisons in the study. Academic libraries were selected for this study

group, however the research questions apply to any type of library. Future research could include study groups of public libraries, school libraries, or special libraries.

The remaining fifteen institutions represent a spectrum of higher education institutions, from Ph.D.-granting institutions to 4-year institutions. A common scheme for classifying higher education institutions is the Carnegie Classification which groups American colleges and universities according to their missions and characteristics (A Classification of Institutions of Higher Education, 1994). The fifteen schools in this study, the URL of their library home page, and their Carnegie Classification are listed in the table below:

<u>SCHOOL</u>	<u>LIBRARY URL</u>	<u>CARNEGIE CLASSIFICATION</u>
Appalachian State University	http://www.library.appstate.edu/	Master's (Comprehensive) Universities and Colleges I
East Carolina University	http://www.lib.ecu.edu/	Doctoral Universities II
Elizabeth City State University	http://www.ecsu.edu/ECSU/Library/library_body.html	Baccalaureate (Liberal Arts) Colleges and Universities II
Fayetteville State University	http://wwwlib.uncfsu.edu/index.htm	Master's (Comprehensive) Universities and Colleges I
North Carolina A&T University	http://www.library.ncat.edu/	Master's (Comprehensive) Universities and Colleges I
North Carolina Central University	http://www.nccu.edu/library/shepard.html	Master's (Comprehensive) Universities and Colleges I
North Carolina State University	http://www.lib.ncsu.edu/	Research Universities I
UNC Asheville	http://bullpup.lib.unca.edu/library/	Baccalaureate (Liberal Arts) Universities and Colleges I
UNC Chapel Hill	http://www.lib.unc.edu/	Research Universities I
UNC Charlotte	http://libweb.uncc.edu/	Master's (Comprehensive) Universities and Colleges I
UNC Greensboro	http://library.uncg.edu/index.html	Doctoral Universities I
UNC Pembroke	http://www.uncp.edu/library/	Master's (Comprehensive) Universities and Colleges I

UNC Wilmington	http://library.uncwil.edu/	Master's (Comprehensive) Universities and Colleges I
Western Carolina University	http://www.wcu.edu/library/	Master's (Comprehensive) Universities and Colleges I
Winston Salem State University	http://www.wssu.edu/library.htm	Baccalaureate (Liberal Arts) Colleges and Universities II

A variety of institutional types and sizes were included in the study to produce results independent of institutional characteristics.

At each school, the main academic library web site was identified and evaluated. The web sites of other, specialized campus libraries were not considered in this study. Each site was reviewed thoroughly by the investigator, with attention paid to all library services offered via the web site. The reviews took place between September 25, 1999 and October 19, 1999. An evaluation sheet was completed for each web site. A sample evaluation sheet is located in Appendix A.

Several different categories of service were used in the evaluation: reference, collections, circulation, interlibrary loan and document delivery, catalog, and administration/other. Reference was defined as public services typically offered by a reference department such as reference desk question/answer services, bibliographic instruction, and other user assistance. The collections category included collection development and acquisitions activities, print and electronic collections, and special collections. Circulation included services typically offered by the circulation department including borrowing, renewals, and hold requests. Interlibrary loan was defined as interlibrary loan and document delivery services. The catalog category was defined as any service dealing with the main library catalog

of resources. Finally, administrative/other included general library information such as hours and overview, library news, organizational information, department descriptions and staff lists, and information specifically for staff.

During the evaluation, the investigator noted each instance of a web-based service offered by the library and placed it in one of the categories mentioned above. Web-based services were defined as any library services using web technology (e.g. html documents, Internet browsers) to deliver information to users. Users of these services might include the general public, a restricted set of users (i.e. on campus users only), or internal audiences. Examples of web-based services examined in this study include electronic databases, online bibliographies, email reference service, virtual tours of the library, and web-based instruction modules.

The information collected about the library web sites was studied from two perspectives. First, the kinds of services offered in each category were examined regardless of institution. A list of services offered in each category was compiled and ranked based on the number of libraries offering the service. Second, the kinds of services offered by each institution were evaluated and scored. Each web site received a ranking based on their total score; the total possible score was 140 points.

To determine the scores, the investigator considered the services offered within each category and assigned a score based on the scope of the services offered and the extent to which the services made use of web features. For example, a library offering interactive, web-based instruction modules received a higher score than one simply offering a schedule of

upcoming classes. Similarly, a library offering patrons the ability to manage their account (i.e. renewals, holds, etc.) received a higher score than one offering patrons the ability to simply *view* their account. The sample evaluation sheet in Appendix A contains examples of the types of questions considered during the scoring.

The possible scores were weighted to represent the relative importance of each in terms of library users. A higher possible score represented an area of library service considered important to most library users. These areas were determined by the investigator, and were intended to highlight the importance of the library web site as a vehicle for delivering services to users. For example, the administration category had a lower possible score than reference because the reference function in libraries is generally more user-oriented than the administrative function.

In addition to the review of web sites, a questionnaire was used to gather additional information to supplement the data gathered during the web site review process. A copy of the questionnaire is located in Appendix B. The questionnaire was approved by the Academic Affairs Institutional Review Board at UNC Chapel Hill.

Questionnaires were sent to a representative of each library institution. The persons who received the questionnaire were selected based on their involvement with web-based library services at their respective institution. Generally, these individuals were webmasters or systems librarians. Respondents were asked to describe the web-based services offered at their institution, the staff resources devoted to web-based services, and the institutional process for developing new web-based services.

The initial request was emailed to participants on October 4, 1999, and two follow-up requests were sent to those who had not responded. Participants were given the choice of answering the questionnaire by web form, by electronic attachment, or by phone. Ten out of fifteen questionnaires were returned successfully.

An existing data source was used to gather statistics about each institution and library. The primary source of this information was the Statistical abstract of higher education in North Carolina, 1998-1999. Compiled annually, this statistical abstract contains data about the size and services of all the libraries included in this study. These data were compared with data from the web site reviews and questionnaires to determine whether institutional size or library budget affected the web site scores.

The data were sorted and evaluated several different ways to answer the four main research questions of the study, which were a) to describe the range of library services offered via the web; b) to demonstrate how libraries are using the unique features of the web to offer new and/or better services; c) to compare a group of library web sites and evaluate the relationship with institutional characteristics; and d) to assess the institutional resources and processes in place to support web-based services.

Results & Discussion

Web-based services offered

Through the web site reviews and the questionnaires, this study evaluated web-based services in six main service areas: reference, circulation, interlibrary loan and document delivery,

collections, catalog, and administration/other. For each area, a list of specific services offered was compiled. The services range from simple, text-based information to interactive modules. Most libraries offer simple, text-based information, while a few are beginning to offer more interactive services.

The discussion of each category highlights specific examples of advantages offered by web-based services. Especially creative or interesting examples of web-based services are also noted. These results document the current state of library web services and, ideally, the results can also serve as idea-generators for libraries looking to expand their web-based services. The following lists, compiled based on data collected from the web site reviews and questionnaires, represent the current range of web-based services available at the study libraries.

For the purposes of this study, the reference category was defined as public services typically offered by a reference department such as reference desk question/answer services, bibliographic instruction, and other user assistance. In the reference category, the study libraries offer the following web-based services:

<u>Service</u>	<u>Number of libraries</u>
Ready reference links	12
General information about instructional services offered	11
Descriptive departmental information	10
Subject bibliographies	10
Staff contact information	9
Reference question/answer service (web form)	6
Instructional guides (text based instructional information)	6
Class-specific guides	5
Reference question/answer service (email link)	3
Interactive/web-based instruction modules	3
Instruction request form	2

Ready reference links and subject bibliographies are examples of typical web-based services offered in the reference area. This is consistent with the use of the web as an information resource. Reference question/answer service, either via web form or via email, is also a frequently offered service. Notably, NC State University Library implemented a slightly unusual variation of ready reference links; the library staff combined ready reference links with links to the library's fee-based electronic resources. Most libraries separate the two sets of information, but an integrated list is actually more user-friendly because it reduces the number of places a user has to search. It also represents an advantage of web-based services: the ability to connect and hyperlink between resources.

Interactive instructional modules are less common among the study libraries; only three libraries in this study group offer web-based instruction modules. UNC Asheville requires a library research course of all students, and the library web site provides an online syllabus and a practice test for the course. Students can complete and score the test online. Both UNC Chapel Hill and NC State University Libraries offer a general library tutorial on their web sites. For example, NC State University Libraries offers LOBO (Library Online Basic Orientation), described on their web site as a "multimedia program which will introduce you to basic information seeking skills." LOBO is an excellent example of how the web can be used to deliver and improve library services. It combines useful information and interactive educational experiences, and, unlike a traditional instruction class, can be completed by the user at his/her convenience.

The collections category included collection development and acquisitions activities, print and electronic collections, and special collections. In this category, the study libraries offer the following web-based services:

Service	Number of libraries
Electronic indexes, databases, and journals	15
Descriptions of collections	11
Request form for new items	11
Descriptive department information	9
Staff contact list(s), i.e. subject bibliographers	9
Policies (about collection)	8
Finding aids (other than OPAC or electronic indexes)	7
Digital collections (other than databases and journals)	5
Electronic reserves (digital documents)	5
New materials list	3
Status of items (on order, processing, etc.)	1

The most common type of web-based service offered in this category is access to electronic indexes, databases, and journals. Thanks to a statewide effort, all public libraries and public higher education institutions have access to a collection of electronic information called NCLive, available on the web at <http://www.nclive.org>. This collection offers access to databases and indexes of information previously only available in print.

Other commonly offered services in the collections area are text-based descriptive material, policies, and requests form for new items. It should be noted that many of the forms to request new materials are available through the online public access catalog (OPAC) software. This is particular true of the consortium libraries sharing OPAC services, such as Coastal Library Consortium and Western NC Library Network. About half of the libraries in

this study with request forms have forms via their OPAC, and the others have forms directly on their web site. Similarly, many of these consortium libraries have course reserves information (the data, not necessarily the documents themselves) in their OPAC systems. Course reserves are included and discussed below in the catalog category.

Some web-based services of note in the collections category include UNC Asheville's Electronic Journal Title Lookup. This is described on their web site as an Access database that covers journal titles from subscription databases such as EBSCO Host, as well as titles that the library subscribes to individually. After a user searches the database, he/she can link directly to the resources needed. This kind of integrated hyperlinking characterizes one of the main advantageous features of the web.

Another notable service in this category is NC State University Libraries' MyLibrary. This innovative service is a user-customizable web interface to a comprehensive set of library services. Users create a profile to identify their specific areas of interest, links to resources they use frequently, and saved searches. The result is a workspace that includes links to resources, library news, updates on new resources, and more. MyLibrary is an entire library collection personalized for the individual user. Of all the examples of web-based library services, this one best characterizes all the advantages of web-based services including hyperlinks, integration across library departments, and remote user access.

Two growing and related areas of service in this category are electronic reserves and digital collections. Both provide access to actual documents and resources, including text, images, video, and other multimedia items. This is an obvious advantage over traditional

collections, which require the user to be in the same physical location as the items. UNC Pembroke has plans to implement electronic reserves in the near future. The study libraries' digital collections include examples, such as UNC Chapel Hill's Documenting the American South project, which consists of digitized collections of manuscripts, texts, and images. NC State University Libraries has an entire department, Digital Library Initiatives, dedicated to creating digital collections.

The circulation category covers services typically offered by the circulation department including borrowing, renewals, and hold requests. The study libraries offer the following web-based services in the circulation category:

<u>Service</u>	<u>Number of libraries</u>
Patron accounts - view information only	12
Descriptive department information	12
Circulation policies	11
Patron accounts - interactive services (e.g. renewals, holds)	9

Circulation is an area that impacts most library users and involves personalized user information, so it makes sense that libraries would be interested in making comprehensive and personalized services available to users via the web. Web-based access to patron accounts means that users can access their personal information about items checked out, due dates, etc. at their convenience. The more advanced services, like renewals and holds, mean that users can manipulate and interact with the circulation system without having to come to the library, wait on line, or talk to a staff member. This represents a timesavings for most users. It should be

noted that for most of the study libraries, circulation services are a component of their OPAC software that is purchased from an outside vendor. Also, in two cases the access to patron accounts is via telnet which is not exactly a web-based service (like the web, telnet is a system for accessing information on the Internet). However, those two cases were included in the numbers above.

The interlibrary loan category includes interlibrary loan and document delivery services.

The study libraries offer the following services in the interlibrary loan category:

<u>Service</u>	<u>Number of libraries</u>
Descriptive department information	13
Policies (specific to ILL and document delivery)	12
Request form(s)	10
Staff contact list	8
Integrated services (i.e. ABC Express links in catalog)	3
Email requests	1

Text based information and policies are again the most commonly offered services here.

Request forms are also very popular, however there is a considerable range in the type and sophistication of the forms. Most of the forms are straightforward forms that a user fills out with his/her name, ID, and the information about the item requested. This service in itself is an advantage over traditional methods that require a user to go to the library and fill out a paper form.

A few libraries in the study group offer even more advanced request forms and services than described above. For example, both Western Carolina University Library and NC State

University Libraries have restricted access request forms. Once a user has created a personal account, he/she can manage multiple ILL requests at once without having to re-enter personal information. In another example, the libraries of the Western North Carolina Library Network (including Appalachian State University Library and UNC Asheville) offer users the opportunity to request ILL services directly from specific records the OPAC. This ABC Express service is only available for items held by libraries in the WNCLN consortium. However, the integration of OPAC and ILL services is an excellent example of how the web encourages the development of cross-departmental services.

In this study, the fifth category considered was the catalog, defined as any service dealing with the main library catalog of resources. This category is slightly different from the others in that it only deals with one primary service - access to the online public access catalog (OPAC). It examines specific components of and services within that primary service. The libraries in this study offer the following services in the catalog category:

Service	Number of libraries
Search library resources	14
Course reserves information	11
Mark and save catalog records	10
Hyperlinks to online resources	10
Integration with other services (i.e. ABC Express/ILL)	5
Search multiple catalogs at once	1

It is important to note here that most of the libraries belong to consortiums through which they share OPAC services with several other libraries in the consortium. Also, all of the libraries

purchase their OPAC software from outside vendors. The services offered in this area typically depend on the specific type and version of software purchased. However, there are still some significant distinctions among services offered.

All libraries in the study group have an OPAC, and only one of them does not have an interface to the OPAC available on their web site. The rest offer web-based access to the OPAC. The critical distinctions among them involve the level of advanced services offered. For example, many libraries allow users to mark and save catalog records. Another advanced feature is hyperlinking to online resources, including links to other web-based resources such as web sites. Some libraries have an OPAC integrated with other library services, such as interlibrary loan or electronic collections. One specific example of this is the ability to make interlibrary loan requests from specific catalog records, mentioned above. All these advanced features capitalize on the advantages of the web.

An especially interesting service offered by NC State University Libraries is the ability to search multiple catalogs at once, including catalogs from academic and research libraries around the world. This represents a significant benefit to users, who traditionally have to search each catalog separately. Common data standards make this information-sharing possible behind the scenes, but the web makes it an easy to access and easy to understand service that patrons can use from any location.

Course reserves are included and discussed here because many of the study libraries include course reserves information in their catalog. So, users have access to the course reserves information via the web if the catalog is available on the web. One library, UNC

Chapel Hill, makes its course reserves information available only through the telnet version of its catalog. As noted above, this is not exactly a web-based service, however telnet is a simple, text-based way of accessing information on the Internet, so the case was included in the numbers above. Course reserves in this category differ from the electronic reserves discussed in the collections category above. Electronic reserves represent access to the documents and collections themselves, while course reserves information consists of data about the reserves, such as title, author, and instructor name.

The last category, administrative/other, includes general library information such as hours and overview, library news, organizational information, department descriptions and staff lists, and information specifically for staff. The study libraries offer the following services in the administrative/other category:

<u>Service</u>	<u>Number of libraries</u>
Staff list	13
Suggestion form	13
Library descriptive information (overview, mission, etc.)	12
Library news (briefs)	8
Staff functions	8
General library policies	7
Library news (formal publication or newsletter)	2
Map of library	2
Information about special exhibits	2
Virtual tour	2

Nearly all the libraries include some basic information about their library on their web site, although some do so more comprehensively than others. For example, some libraries provide

only a paragraph or two of descriptive information, while others describe each department and service in detail. Although two libraries offer a “virtual tour”, both tours consist of simple text and still images.

Library patrons and staff alike use the services discussed in this paper, but some libraries have staff-only services as well. Examples of internal services include staff policies, frequently used links (most common in reference and technical services departments), shared databases, administrative memos and minutes, etc. Two libraries had restricted access portions of their web sites for staff only (Note: other libraries may have similar restricted access areas not visible to an outside visitor). Even though this study focused primarily on services to library users rather than staff, it seemed important to mention that many of the study libraries use the web for internal functions. Future research could investigate this important area.

Library web site comparisons

Using data gathered from the web site analysis and the questionnaires, a numeric score was generated for each library web site in the study. The score indicates the scope and nature of web based services offered by each library. A total score of 140 points was possible.

The investigator assigned scores based on the scope of the services offered and the extent to which the services made use of web features. For example, a library offering interactive, web-based instruction modules received a higher score than one simply offering a schedule of upcoming classes. Similarly, a library offering a full range of reference services

through their web site, including question/answer service, ready reference links, bibliographies, and instructional modules, received a higher score in the reference category than a library that offers only a few of these services. The scoring process is described in the methodology section.

Based on the total scores (total possible was 140), the study libraries were ranked as follows:

<u>RANK</u>	<u>SCHOOL</u>	<u>SCORE</u>
1	North Carolina State University	139
2	University of North Carolina at Greensboro	124
3	University of North Carolina at Asheville	123
4	University of North Carolina at Charlotte	110
5	University of North Carolina at Wilmington	110
6	Appalachian State University	105
7	Western Carolina University	100
8	University of North Carolina at Chapel Hill	94
9	East Carolina University	79
10	North Carolina A&T University	77
11	Fayetteville State University	71
12	Winston Salem State University	69
13	University of North Carolina at Pembroke	57
14	North Carolina Central University	34
15	Elizabeth City State University	4

Libraries with higher scores consistently incorporated a high level of web-based services in each of the six categories in the study, indicating a commitment to providing a full-range of web-based services and making the library site an integral part of the library as a whole. Libraries with lower scores had fewer instances of web-based services. They typically received high scores in the catalog and reference areas and lower scores in the other categories. This may

indicate a narrower view of the role of the library web site and/or inadequate staff time or staff knowledge to accomplish an expanded web site.

To determine whether institutional size or library budget affected the web site rankings, the web site scores were compared against institutional characteristics. A variety of characteristics, such as type of institution, size of student population, and library expenditures, were selected from the Statistical abstract of higher education in North Carolina, 1998-1999.

The table below lists the study libraries in order of their web site score, along with some representative data elements:

<u>Rank</u>	<u>Institution</u>	<u>Carnegie class</u>	<u>Number of students</u>	<u>Total Library Operating Expenditures</u>
1	North Carolina State University	Research I	27,176	\$17,221,561
2	UNC Greensboro	Doctoral I	12,700	\$6,208,427
3	UNC Asheville	Liberal Arts I	3,175	\$1,691,559
4	UNC Wilmington	Comprehensive I	9,643	\$3,015,827
5	UNC Charlotte	Comprehensive I	16,670	\$6,362,367
6	Appalachian State University	Comprehensive I	12,386	\$5,063,129
7	Western Carolina University	Comprehensive I	6,287	\$2,783,520
8	UNC Chapel Hill	Research I	23,827	\$24,333,270
9	East Carolina University	Doctoral II	17,799	\$8,929,212
10	NC A & T State University	Comprehensive I	7,354	\$3,374,942
11	Fayetteville State University	Comprehensive I	3,943	\$1,802,667
12	Winston-Salem State University	Comprehensive II	2,778	\$1,112,604
13	UNC Pembroke	Comprehensive I	2,998	\$1,354,548
14	NC Central University	Comprehensive I	5,580	\$3,206,629
15	Elizabeth City State University	Liberal Arts II	1,903	\$922,352

This comparison identified no significant correlation between the score from the web site analysis and the institutional characteristics of size or budget. This study sample is extremely

small, and a larger study population might yield different results. However, other research studies support this lack of a relationship between institutional characteristics and web site quality or performance. Hightower et al (1998) found that library web site hits were not correlated with other library statistics (e.g. circulation figures) or with institutional characteristics (e.g. number of students). The authors suggest instead that perhaps the character and quality of the web site itself more directly influence usage (pp. 64). Other factors, such as uniquely talented staff members or administrative support, might be better predictors of web site quality. This is a direction for future research.

Institutional Resources

This study also assessed the library staff resources and procedures dedicated to web-based services. The questionnaire responses were the data source for this assessment. Respondents were asked to describe a) the type and number of staff resources committed to developing or implementing web services, and b) the procedures used to develop new web services.

A total of 10 (out of 15) responses to the questionnaire were received. With such a small number of study participants, as well as a wide variety of responses, it is impossible to generalize from the responses. Since not every library responded to the questionnaire, it is also difficult to compare the results of this assessment with the results of other sections of the study as originally intended, such as the library web site comparisons. Even so, it is useful to compile the responses to demonstrate the scope of answers.

Responses to the question on the type and number of staff resources committed to developing or implementing web services are summarized below, in order of rank from the web site comparison:

<u>RANK</u>	<u>LIBRARY</u>	<u>PERSONNEL</u>
2	University of North Carolina at Greensboro	Most web work is done by 7 staff members of the Electronic Resources and Information Technology (ERIT) group
3	University of North Carolina at Asheville	Web team has 4 members, including the library webmaster; Electronic resources team has 3-4 members
4	University of North Carolina at Charlotte	Webmaster is a reference librarian who maintains the web site on a volunteer basis (about 20 hours a week); Library also has 5 systems staff and an Electronic Collections Acquisitions Committee (ECAC)
5	University of North Carolina at Wilmington	Two staff members are responsible for web (Systems Librarian and Library Technician); Individual librarians can also develop their own web pages; There is no web committee
8	University of North Carolina at Chapel Hill	Responsibilities for web services are distributed among many staff throughout the library ("cannot be broken out"); Web committee includes all levels of staff and includes representatives from other/specialty libraries on campus
9	East Carolina University	Web committee includes staff from all units; Systems staff includes 15 full-time and 20 part-time
11	Fayetteville State University	Head of Technical Services is responsible for web, with assistance from staff
13	University of North Carolina at Pembroke	Webmaster is also a reference librarian; Technology Planning Subcommittee consists of representatives from each area of the library
14	North Carolina Central University	"None"
15	Elizabeth City State University	Library Network Coordinator is responsible for web with assistance from staff; Library also has a telecommunications committee

It is generally true that the libraries ranking higher on the web site comparison tend to have a specific team dedicated to either web issues or technology issues, whereas lower ranked libraries tend to have fewer personnel dedicated to web issues. This suggests that libraries with more personnel dedicated to web-based services can offer a broader range of services.

Respondents were also asked to comment on the procedures used to develop new web services. The most common response to this question was that ideas are discussed by various committees (sometimes a web committee but more typically an electronic resources committee), and once approved they are forwarded to the webmaster or web team to implement. Several respondents commented that the procedures vary or that there are multiple procedures. One respondent noted that new ideas are generated through informal discussion among librarians.

Norm Medeiros (1999) suggested that committees are able to create better library web sites than a single person because they have a broader and more holistic perspective of the role of the library web site as the "information epicenter" of the library. While the results of this study do not clearly indicate a significant relationship between the number of staff involved and the library web site rank, the results do suggest a tentative link between the two. A larger study sample would address the question more definitively.

Conclusions & Future Directions

The results of this study demonstrate a broad range of web-based services offered by academic libraries. Most libraries offer a minimum of basic, text-based services, such as

descriptive information about the library, policies, and ready reference links. Most libraries also offer web-based access to the mainstay of library services, the online public access catalog (OPAC). Fewer libraries offer more advanced services, such as online request forms, and bibliographies. Fewer still offer innovative services such as digital collections and cross-departmental services.

Advanced web-based services exploit the most useful features of the web. These useful features include the ability to hyperlink, the use of a simple graphical interface, and the ability to connect from any location. Such features allow libraries to improve existing services and develop new services. This study identified specific ways in which the web allows libraries to improve and develop services. Some of the key improvements and developments are: a) hyperlinks between resources, such as OPAC records that link directly to web sites or other web-based services; b) cross-departmental services, such as the integration of ILL services with the OPAC; c) simple user interfaces to multiple services, such as the ability to search many electronic databases at one time; and d) remote access to library services, such as digital collections.

The libraries in this study were ranked based on the scope and nature of their web-based services. The rankings indicate a wide range of services offered since the highest score received was 139 and the lowest was 4 (out of a total of 140 points). When the rankings were compared with other institutional characteristics, such as size, no relationship was evident.

This study also found that libraries dedicate staff resources to web services in a variety of ways. In some cases, only one library staff member is responsible for the web site, while in

others an entire team handles the web site. Library web teams typically include representatives from different library departments or divisions. Ideas for new web services are often generated from the library staff as a whole, decided upon by a committee, and implemented by the webmaster or web team. This study did not establish a clear relationship between the institutional resources and the quality or scope of web-based services. Further research with a larger study sample might provide confirmation.

This study was limited by the number and type of libraries examined. Since the study population is quite small and includes a diverse group of libraries, generalizations are difficult to achieve. Future research could include a larger number of study libraries and/or libraries of various types, such as public libraries, school libraries and special libraries. It might also be useful to study web-based services within a single Carnegie classification, or to compare multiple libraries within several Carnegie classifications.

It is also important to consider the transitory nature of the web and computer technology. The results of this study represent a snapshot of current practices with web-based services. A simple library web site viewed today might be completely revamped with advanced features tomorrow. Web sites and web technologies are constantly changing, and how libraries use the web is also evolving. Future studies might attempt to measure the changes taking place, or the factors that influence change.

Despite (perhaps even because of) these changes and uncertainties, the role of the web in libraries is an important area for research. As the Internet gains in popularity, libraries and library users will increasingly turn to the web for assistance. The present study demonstrates

the significant influence of the web on library services. Because of the web, library services are altered and/or improved and new services are developed. Web-based library services affect services offered by libraries and change the ways that users interact with library resources.

The more we know about the factors involved, the better able we will be to create web-based services that are valuable and that take advantage of the unique strengths of the web.

Appendix A – Sample Web Site Evaluation Sheet

<u>SERVICE AREA</u> (with representative questions considered during the review)	<u>POSSIBLE SCORE</u>	<u>ACTUAL SCORE</u>	<u>COMMENTS</u>
Reference			
Policies/general info/staff contacts Are reference policies and information about the department described? Staff names and email addresses provided?	5		
Ready reference and reference questions Is there general information about how to ask reference questions? Links to ready reference sources? Can patrons ask questions via the web? Web form provided?	10		
Bibliographies/Guides Are web-based bibliographies and/or research guides available? Do they include hyperlinks to online resources?	10		
Instruction Is there general information about instructional services? Are printed (text-based) instructional guides available? Are interactive, web-based instruction modules available?	15		
Collections			
Policies/general info/staff contacts Are collection policies and general information available? Are staff names and email addresses provided?	5		
Item/order requests Is there information about how to request a new item or send comments about the collection? Is a web form provided?	5		
Access to collections Are there description(s) of available collections? Are finding aids on the web? Are actual collections on the web? Are electronic journals and indexes available?	15		

(continued)

<u>SERVICE AREA</u> (with representative questions considered during the review)	<u>POSSIBLE SCORE</u>	<u>ACTUAL SCORE</u>	<u>COMMENTS</u>
Circulation			
Policies/general info/staff contacts	5		
Are circulation policies available? Are staff names and email addresses provided?			
Patron accounts	10		
Is there information about how to access patron account information? Can patrons access their account information via the web? Can patrons manipulate their accounts on the web (e.g. renewals)?			
Administrative/Other			
Policies/general info/staff contacts	5		
Are administrative policies, mission statement, overview available? Are staff names and email addresses provided?			
Feedback or suggestions	5		
Is there information on how to send feedback to the library? Is a web form provided?			
News	5		
Is there regularly updated news about the library on the web? Is there a formal library news publication on the web?			
Other internal functions	10		
Is there information and/or links for staff members to use in their work? Are there shared items in an intranet/restricted area?			
Catalog			
OPAC	15		
Is there a web interface? Can patrons perform advanced and/or interactive functions (e.g. saving records, linking to online resources, etc.)?			
Interlibrary Loan/Document Delivery			
Policies/general info/staff contacts	5		
Is general information about ILL and/or document delivery on the web? Are staff names and email addresses provided?			
Services	15		
Can patrons request ILL services via the web? Is a web form provided? Are items delivered to patrons via the web?			
TOTAL	145		

Appendix B – Questionnaire

Internet Based Library Services Questionnaire

This questionnaire is part of a study to examine the availability of library services offered using internet-based technology by the schools of the UNC system. The study is being conducted by Danielle Borasky, graduate student in the School of Information and Library Science at the University of North Carolina at Chapel Hill. Questions about the study should be directed to Danielle Borasky (borad@ils.unc.edu) or to Dr. Evelyn H. Daniel, faculty advisor (daniel@ils.unc.edu).

Please fill in the form below.

1. Your name: _____

2. Your title: _____

3. Your email address: _____

(note: your personal information above will only be used to follow up with you, if necessary. Your personally-identifying information will NOT be included in the final report.)

4. Name of your institution: _____

5. Would you like to receive a copy of the final report when it is finished? _____

(if yes, please be sure that your email address is filled in correctly in question #3 above).

6. Please describe the internet-based services offered by your library by filling in the table below as completely as you can. Focus on the services offered by the main academic library on your campus.

	A. Briefly describe the internet based services offered in each category (refer to the definition of internet based services below):	B. Indicate who has access to these services (check as many as you like):	C. Based on your opinion, rate the level of sophistication of these internet based services:
7. Reference (include reference desk, bibliographic instruction, public service, etc.)		<input type="checkbox"/> all internet users, regardless of institutional affiliation <input type="checkbox"/> on-campus internet users <input type="checkbox"/> off-campus internet users <input type="checkbox"/> in-house library patrons <input type="checkbox"/> restricted to affiliated users	<input type="checkbox"/> 0 none <input type="checkbox"/> 1 basic <input type="checkbox"/> 2 average <input type="checkbox"/> 3 advanced
8. Collections (include collection development, digital or electronic collections, etc.)		<input type="checkbox"/> all internet users, regardless of institutional affiliation <input type="checkbox"/> on-campus internet users <input type="checkbox"/> off-campus internet users <input type="checkbox"/> in-house library patrons <input type="checkbox"/> restricted to affiliated users	<input type="checkbox"/> 0 none <input type="checkbox"/> 1 basic <input type="checkbox"/> 2 average <input type="checkbox"/> 3 advanced

(continued)

9. Circulation		<input type="checkbox"/> all internet users, regardless of institutional affiliation <input type="checkbox"/> on-campus internet users <input type="checkbox"/> off-campus internet users <input type="checkbox"/> in-house library patrons <input type="checkbox"/> restricted to affiliated users	<input type="checkbox"/> 0 none <input type="checkbox"/> 1 basic <input type="checkbox"/> 2 average <input type="checkbox"/> 3 advanced
10. ILL/Document Delivery		<input type="checkbox"/> all internet users, regardless of institutional affiliation <input type="checkbox"/> on-campus internet users <input type="checkbox"/> off-campus internet users <input type="checkbox"/> in-house library patrons <input type="checkbox"/> restricted to affiliated users	<input type="checkbox"/> 0 none <input type="checkbox"/> 1 basic <input type="checkbox"/> 2 average <input type="checkbox"/> 3 advanced
11. Catalog (include OPAC, cataloging activities, etc.)		<input type="checkbox"/> all internet users, regardless of institutional affiliation <input type="checkbox"/> on-campus internet users <input type="checkbox"/> off-campus internet users <input type="checkbox"/> in-house library patrons <input type="checkbox"/> restricted to affiliated users	<input type="checkbox"/> 0 none <input type="checkbox"/> 1 basic <input type="checkbox"/> 2 average <input type="checkbox"/> 3 advanced
12. Other/ Administrative (include human resources, financial systems, information systems, etc.)		<input type="checkbox"/> all internet users, regardless of institutional affiliation <input type="checkbox"/> on-campus internet users <input type="checkbox"/> off-campus internet users <input type="checkbox"/> in-house library patrons <input type="checkbox"/> restricted to affiliated users	<input type="checkbox"/> 0 none <input type="checkbox"/> 1 basic <input type="checkbox"/> 2 average <input type="checkbox"/> 3 advanced

13. Describe the process used at your institution to develop new internet-based services (for example, do you have a committee that comes up with new ideas? what happens after that?):

14. Describe the type and number of staff resources committed to developing or implementing internet-based services at your institution (i.e. how many technical staff? what are their roles/positions? how many people are on the web committee? are they professional staff/administrators/support staff?):

15. OPTIONAL Comments:

DEFINITION: For this study, internet-based services are defined as any library services that use internet technology (e.g. html documents, internet browsers) to deliver information to users and are offered to the general public, to a restricted set of users (i.e. on campus users only), or to internal audiences. Services offered can include: written policies, online access to databases, online bibliographies, email reference service, virtual tours of the library, web-based instruction modules, etc.

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